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ORIGINAL COMMUNICATIONS.

ON CONICAL CORNEA.

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My attention was some years ago directed to that singular change in the eye, to which English writers have applied the term CONICAL CORNEA; and I communicated with many eminent ophthalmic surgeons on the subject, besides instituting experiments myself. The information which has resulted, though throwing less light than could have been desired on the true nature and management of this intractable disease, possesses a considerable amount of interest, and, combined with other materials, will form the subject of this article.

Conical Cornea does not seem to have attracted the attention of oculists until within the last hundred years; and the first writer who makes mention of it is John Taylor, in his *Nova Nosographica Ophthalmia*, printed at Leipsic, in 1766. Leveillé has usually had the credit of the first recorded observation, but Taylor preceded him. Von Ammon was the first to notice the circumstance of its being, in some instances, a congenital defect, and also an hereditary peculiarity. He connected with it a singular form of the head. "It is worthy of remark", says he, "that also in this *hyperkeratosis congenita*, a peculiar form of the head obtains; viz., the so-called pointed head *(spitskopf)*. I have once noticed this in a family of sisters, who were all affected with congenital hyperkeratosis". Mr. Wilde also inclines to this opinion; but in Anne Reeder, whose case will hereafter be mentioned, the head was singularly elongated in the antero-posterior direction. There are not sufficient data yet to decide whether Conical Cornea and Conical Crania have any constant co-relation.

Conical Cornea appears to be peculiar to the human species; and so far as my inquiries have gone, it is limited to civilized races To ascertain whether it exists in the brute creation, I applied to Mr. Percival, the distinguished veterinary surgeon, who states that it certainly is not found in horses, and in his opinion, does not appear in any of the lower animals.

There are not, however, sufficient grounds for denying the possibility of its occurrence amongst them, especially if, as will hereafter be shewn, it is one of the results of inflammation; for with Squirrels, staphyloma, and leucoma, other results of inflammation, are common diseases; and in Lemurs also, I have observed examples of the same. In one instance there was a very fair specimen of a "conoidal globe".

It would appear as if Conical Cornea were a disease prevailing most in warm climates and warm situations, and becoming more and more rare as we approach the colder latitudes. Sir John Richardson informs me, that he "observed no cases of Conical Cornea among the inhabitants of the northern regions of America. Conjunctival ophthalmia is exceedingly common among the Indians and Esquimaux, and often terminates in blindness and opacity; but diseases of the humours, or ball of the eye, are not common". Conical Cornea is almost unknown in the north of Germany; and Himly, who has written on the subject, never saw a case. In the north of England it is less common than in the south and west, and in Scotland rarer than in England. Dr. Mackenzie has communicated to me, that of 15,924 cases treated at the Glasgow Eye Infirmary, only four were Conical Cornea. Dr. A. Anderson, of Glasgow, has only seen two cases since 1842. Dr. Cadenhead, of Aberdeen, says that, "out of upwards of at least 8000 eye patients who have applied to the Aberdeen Ophthalmic Institution, and to the Royal Infirmary Ophthalmic Wards, under my charge, I have only seen three cases—two females and one male"; and Mr. Walker, of Edinburgh, tells me that, of 7679 patients at the Edinburgh Eye Dispensary, there was *not one* instance of Conical Cornea. Compare with this the returns from China, where, of 6787 cases, no less than twenty-two were examples of this disease; from Dublin, where, of 4050 cases, ten were Conical Cornea; and from Plymouth, where, of 5118 cases, thirteen were Conical Cornea. Moorfields, too, presents a large number—as many as twelve in one year, and ten in another. Mr. James Dixon, the able surgeon to that noble institution, mentioned to me a curious fact,—that he had been looking out for an example of this disease during a whole year without success, when, on a certain morning, no less than three patients presented themselves quite independently of each other, and each with the disease well marked. In the table of returns *(see next page)*, I have only given those of Moorfields for the Metropolis, as patients suffering from Conical Cornea would be likely to seek relief at several institutions, and might thus be reported from each. Mr. Smith, of Southam, communicated to me, in 1847, that within the preceding year or two, he had seen no less than eight cases; and observes, that "they have generally agreed in a few things; they have been temperate, generally water drinkers, they lead sedentary lives, and have all come from a district of the country where a soft brown stone prevails in the earth".

Appearances and Frequency. The terms, 'Cornea Conica', 'Staphyloma Pellucidum Conicum', and 'Conical Cornea', are expressive of the alteration in the form of the Cornea which forms the distinguishing characteristic of the disease. But before the change in the outline of the cornea is sufficiently marked to be obvious to the casual observer, an unusual brilliancy of the eye is visible; a lustre which has been

TABLE, SHOWING THE PROPORTION OF CASES OF CONICAL CORNEA.

	Total Cases.	Con. Corn.
GLASGOW EYE INFIRMARY.		
June 1824 to Jan. 1847 ...	15924	4
ABERDEEN HOSPITAL AND EYE INFIRMARY.	8000	3
EDINBURGH EYE INFIRMARY.		
Jan. 1842 to Jan. 1850 ...	7679	0
MACAO HOSPITAL.		
1841 to 1842	1288	7
1844 to 1845	5499	15
ST. MARK'S HOSPITAL, DUBLIN.		
1845.....	980	2
1846.....	1526	6
1847.....	1544	2
PLYMOUTH EYE INFIRMARY.		
1845.....	936	3
1846.....	848	0
1847.....	918	3
1848.....	1203	4
1849.....	1213	3
MANCHESTER EYE INFIRMARY.		
1834.....	1383	1
1837.....	1486	1
1843.....	1638	1
1844.....	1156	1
1845.....	1536	2

	Total Cases.	Con. Corn.
ROYAL LONDON OPHTHALMIC HOSPITAL, MOORFIELDS.		
1839.....	4891	2
1840.....	5355	10
1841.....	5528	5
1842.....	6085	7
1843.....	6572	0
1844.....	6874	12
1845.....	7005	4
1846.....	7010	9
1847.....	7672	5
1848.....	8382	6
LIVERPOOL EYE INFIRMARY.		
1834.....	1770	2
1835.....	1986	0
1836.....	1965	4
1837.....	2186	0
1838.....	2189	0
1839.....	2230	0
1840.....	2186	0
1841.....	2224	2
1842.....	2244	2
1843.....	2287	1
1844.....	3078	3
1845.....	3462	3
1846.....	3510	2
1847.....	3721	0
1848.....	3798	1

	Total Cases.	Con. Corn.
BRISTOL EYE INFIRMARY.		
1814.....	107	1
1815.....	170	1
1816.....	208	0
1817.....	467	0
1818.....	488	1
1819.....	516	0
1820.....	706	0
1821.....	679	2
1822.....	751	0
1823.....	895	3
1824.....	1153	0
1825.....	1239	0
1826.....	1294	3
1827.....	1365	1
1828.....	1385	5
1829.....	1174	0
1830.....	1245	5
1831.....	1227	0
1832.....	1374	1
1833.....	1350	0
1834.....	1388	2
1835.....	1516	1
1836.....	1647	1
1837.....	1823	3
1838.....	1911	0
1839.....	1921	1
1840.....	2151	4
1841.....	2141	2
1842.....	2363	1
1843.....	2393	4
1844.....	2245	4
1845.....	2346	2
1846.....	2160	4
1847.....	2095	3
1848.....	2110	1

aptly compared to the sparkling of a diamond, especially in a well-lighted room at night, and which, by adding to the expression of his eyes, afforded considerable consolation to an actor who was the subject of this malady.[1] The brilliancy partly arises from the great number of rays reflected, and partly from the excessive refraction of those rays which penetrate the cornea. If we examine an eye in which the disease is commencing, it will be seen that the anterior chamber is unusually large, the cornea more prominent than natural, and that the outline, having lost its sphericity, has a pyramidal form (Fig. 1). The position of the iris is not altered; as the disease advances (its progress being

[1] "The most pointed cone I ever saw was in a clever comedian; he could only see to read three inches from his eye, and it gave the most peculiar character to the expression of his face on the stage I ever beheld: he thought the disease serviceable in that way." *Extract of a letter from* H. L. SMITH, Esq.

usually very slow), the change in form becomes more decided, and the cornea assumes such an appearance as would be presented were a dew-drop attached to the front of the eye. Mr. Wilde is of opinion, that when this conformation is congenital, the axis of the cone is seldom in the middle of the cornea, but is either above, below the centre, or to one side. No further change may take place, and the cornea may remain in the condition described, for a very long period, as happened in the case of an old lady, at Plymouth, related to me by Dr. Butter, in which the Conical Cornea had undergone no change during thirty years; or the deformity may attain so large a size as to prevent the closure of the lids, as was the case in a cook, a patient of Mr. Isbell, of Stonehouse (Fig. 2). A common change, however, is the formation of a speck of opacity at the extremity of the cone, and a considerable amount of lymph is at times deposited about that spot (Fig. 3).

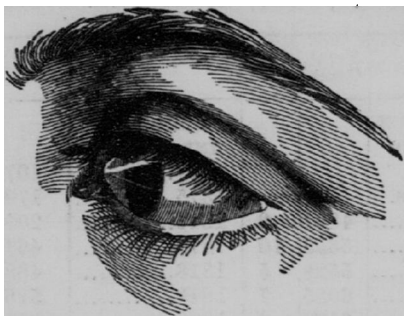

Fig. 1.

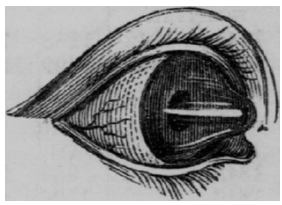

Fig. 2.

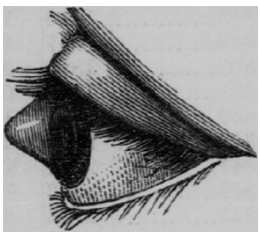

Fig. 3.

Instances have occurred in which there are opaque spots scattered over the cornea, as was observed in a schoolmaster, whose case was mentioned to me by Mr. Walker, of Manchester; and occasionally, though rarely, the whole cornea becomes opaque, as described by Dr. Farre, in a case which will be hereafter referred to. In the great majority of instances, a depression exists at the centre of the apex, as if a small piece had been chipped out.

To the unassisted eye, the surface of the cornea appears smooth and even; but under a lens, it is seen to be broken up by elevations and depressions, as pointed out by Sir David Brewster. Of the existence of these irregularities, I have many times satisfied myself; and, in one case of double Conical Cornea, there were five dimples distinctly seen in one eye, and seven in the other. This condition is probably dependent on unequal absorption, some portions having been removed whilst others remain.

The change of form generally implicates the whole cornea, but there are exceptions, of which the following is an interesting example. "I have seen", says Mr. Middlemore,[1] "one instance of this affection occurring only very partially, for the conical portion of the cornea was only as large at its base as the plane surface of a small split pea. It existed at the lower part of the cornea, resembled a small and extremely conoidal portion of beautifully transparent glass placed upon the surface of the cornea, and occasioned great confusion of sight from the unequal

[1] A Treatise on the Diseases of the Eye, vol. i, p. 533.

refraction of the rays of light". A somewhat similar case fell under my own observation, where the disease was clearly traceable to an ulcer, which, in healing, had left a dimple, or loss of substance in the cornea, and this dimple became the apex of the cone. A just distinction has been drawn between *true Conical Cornea*, in which the alteration in figure is confined to that membrane, and another change in form, the *conoidal eye*, which commences in the sclerotic at the insertion of the recti muscles, and is the consequence of inflammation. Fig. 4, taken from a patient of mine, is a good illustration of this disease.

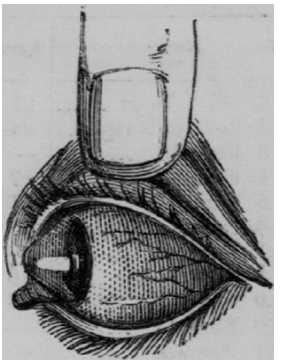

Fig. 4.

In almost all the cases I have seen, both eyes have been affected, although seldom to the same degree. The disease usually attacks one first, and sooner or later, the other. Mr. Wilde states, that "when congenital, both eyes are usually affected, whereas, when it occurs in after life, it is very frequently in but one". I have not been able to satisfy myself that any of the cases examined by me have been congenital, nor does the frequency of its being confined to one eye accord with my own experience; and I believe that it is occasionally overlooked in the early stage. Of forty-eight cases, three presented it in the right eye, eleven in the left, and in thirty-four, both eyes were affected, as will be seen by reference to the table. (*See next page.*)

It would seem to develop itself most frequently about the period of puberty, and to be rare in children and old people. The respective ages of fifty-six patients were as follows:—

Under 10	2	Between 40 and 50	5
Between 10 and 20	15	—— 50 and 60	0
—— 20 and 30	24	Above 60	2
—— 30 and 40	8		

I have no doubt that in the cases entered as above sixty, the disease has been of old standing, and I think it rarely commences much after forty. The total number of ophthalmic cases from which my calculations have been made, is 208,970. Of these, one hundred and ninety-four only were examples of Conical Cornea, giving a general average of 1 in 1077·16.

The averages of the special returns are as follows:—

Macao	1	in	308·50	London	1	,,	1089·56
Plymouth	1	,,	393·69	Manchester	1	in	1199·88
Dublin	1	,,	405·00	Liverpool	1	,,	1941·80
Bristol	1	,,	857·19	Scotland	1	,,	4514·71

Symptoms. Conical Cornea from its earliest commencement renders the individual near-sighted; and if the change in the configuration be considerable, the eye is rendered almost useless. The patients can then only discern objects when held very close and to one side. When looking at a book, for instance, they regard it obliquely, a peculiarity which gives a singular expression to the countenance. The gentleman who favoured me with the drawings, from which figures 5, 6, 7, 8, and 9 have been taken, stated, that although under ordinary circumstances he could not distinguish objects further from the eyes than three inches,

TABLE OF CASES OF CONICAL CORNEA.

No.	Name.	Age.	Eye affec.	Occupation	No.	Name.	Age.	Eye affec.	Occupation
1	Mary Boys	27	Both	Dressmr.	37	Emma Roberts	14	—	——
2	Louisa Wright..	24	Both	Milliner	38	Louisa Gill ...	20	—	Unknown
3	Female	—	Left	Milliner	39	Female	—	—	Housem.
4	Female	17	Left	Sempst.	40	Female	—	—	Cntry. gl.
5	Female	25	Both	Sempst.	41	Lady	71	Both	——
6	Female	17	—	Sempst.	42	Lady	35	—	——
7	Female	—	Both	Milliner	43	Lady	16	—	——
8	Mrs. Saker	40	Both	Cook	44	Lady	14	Both	——
9	Margaret Fitch .	25	Both	Cook	45	Harriet Smith	8	Both	——
10	Female	—	Both	Cook	46	Lady	19	Both	——
11	Female	—	Left	Cook	47	Lady	31	Both	——
12	Jane Matthews	38	—	Cook	48	Mr. Chapman .	—	Both	Med. stu.
13	Harriet Melrose	29	Left	Cook	49	Male	17	Both	Tailor
14	Eliza Richardson	27	Left	Cook	50	Male	29	Both	Shoemak.
15	Female	—	—	Lady's m.	51	Joshua B.	47	Both	Unknown
16	Female	25	Both	Unknown	52	John Bentley..	28	Both	Unknown
17	Female	—	—	Unknown	53	Joseph Diggles	—	Both	Unknown
18	Female	16	—	Unknown	54	Robert Ingram	20	—	Unknown
19	M. E.	22	Both	Lady	55	Evan Folks ...	52	—	——
20	Hannah Hudson	28	Left	Unknown	56	Wm. Matthews	29	Both	Unknown
21	Anne Holland...	21	Both	Unknown	57	Thos. Kennedy	47	—	Unknown
22	Phœ. Greenhalgh	28	Both	Unknown	58	Wm. Harrison	38	—	Seaman
23	Margaret Evans	14	—	Unknown	59	Male	—	—	Baker
24	Elizth. Oxford...	25	—	Unknown	60	Male	—	—	Grocer
25	Emma Housley.	26	Both	Sempst.	61	Male	—	—	Farmer
26	Jemia. Smithson	31	Left	Glover	62	Male	—	Both	Unknown
27	Mary Hall	18	Left	Shoebind	63	Mr. J. D.	20	Both	Med. stu.
28	Hannah Rogers	24	Rt.	Servant	64	M. —..... ..	—	Both	Comedian
29	J. Macnamara..	11	Rt.	——	65	John Parker...	19	Both	Glassblr.
30	Arabella Thomas	19	Both	Servant	66	Geoffry Carter	26	—	Blacksm.
31	Maria Martin ...	23	Both	Servant	67	James Cook ...	32	Left	Tailor
32	Ann Reeder ...	17	Both	Servant	68	Rd. Macdonald	40	Rt.	Surveyor
33	Female	70	Both	——	69	Male	30	Left	Schoolm.
34	Mrs. H.....	40	Both	Lady	70	Luke Gibbon...	23	Both	Carpetwv
35	M. A. Roberts...	18	Both	——	71	Jas. Crawford .	9	Left	——
36	Margaret Gibb	22	—	Unknown	72	E. H. G.....	31	Both	Solicitor

yet, by making pressure upon the temples, vision was increased to six inches. The integuments were pushed forward so as to press slightly on the globes, and I ascertained that the object was equally attained by direct pressure upon the temporal side of the globe, thus altering its antero-posterior diameter. Luminous objects are frequently described as being surrounded by rings or belts, and are sometimes multiplied in number; phenomena arising from the irregular refractions caused by the elevations and depressions of the surface of the Cornea. In some instances the vision is much benefited by dilating the pupil with belladonna, as in the case of an old clergyman, mentioned by Mr. Lawrence, who was, for thirty years, the subject of this affection; and yet was able, by

Fig. 5.
Appearance of halo surrounding a parlour-lamp.

the use of belladonna and the nitrate of silver, to continue his duty in the pulpit, with tolerable accuracy, up to the time of his death. In several instances in which I tried it, not the slightest advantage was derived. In a few instances vision has been improved by looking through a pin-hole aperture; but in many others this also has failed.

The descriptions attached to the five figures are those written by the patient at the foot of each.

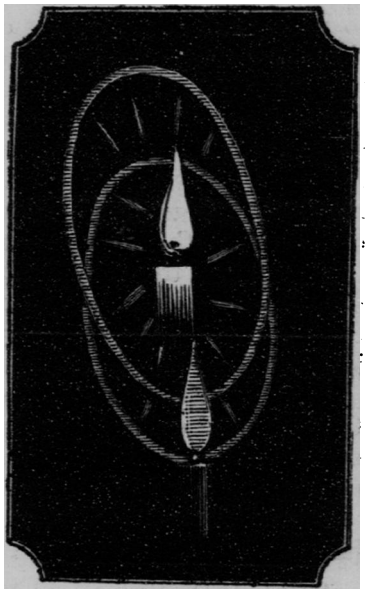

Fig. 6.
Usual appearance of belts surrounding luminous bodies. After gazing at any light for a short time, the belts and rays are so increased in number as to present the appearance of a mass of fire.

CAUSES. Much uncertainty prevails as to the precise nature of the changes which take place in those cases of Conical Cornea, which bear no satisfactory history, nor are traceable to any evident exciting cause.

In a large majority of such cases, we find that the disease is in connexion with an enfeebled state of constitution, and a low condition of the nervous energy; a condition, therefore, in which the *vis vitæ* is impaired, and some at least of the organic functions are imperfectly performed. It has been demonstrated that the cornea, in its natural condition, is not traversed by blood-vessels; that the arteries and veins from which it derives its nutriment form a circle around it, but having barely penetrated its circumference, go no further. We may, therefore, conclude, that the cornea would speedily become sensible of any deficiency in the supply of new material, should the exudation of that material be interrupted. The materials for the repair of the waste of the membrane, (which waste, in common with that of other tissues, is

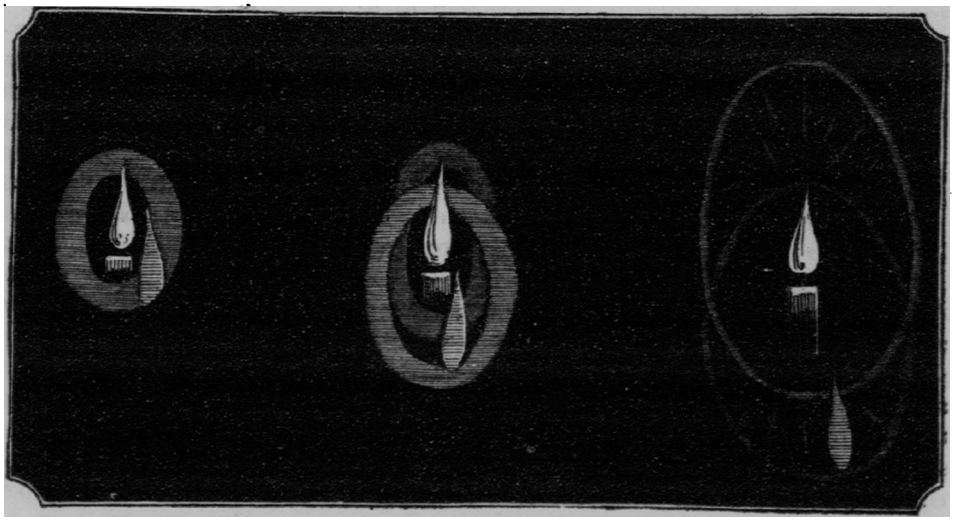

Fig. 7.
Appearance of belts surrounding the flames of three candles placed equi-distant from each other.

constantly in progress), are derived from the blood, each tissue being endowed with the power of selecting such constituents of the blood as are best suited to its composition. If then, there should be any interruption to the supply of particles capable of entering into the composition of the cornea, we might expect to find a change taking place in the structure of that membrane: the old material is being constantly removed by the absorbents, but the supply of new material to repair the waste is arrested; and as the centre of the cornea is the point furthest removed from the source of supply, it might be expected that that part of the membrane would exhibit the change consequent upon the interruption of supply in the most marked manner.

The effect then would be, that the pressure of the muscles of the globe acting upon its contents, would squeeze them forward; and the centre of the cornea, being the point of least resistance, would be projected into a conical form.

We have good reasons for supposing, that, in many instances, Conical Cornea is the result of congestion. Of forty-two cases in which the occupation of the parties was known, there were seven cooks, ten dressmakers and needle women, three tailors, a carpet-maker, a surveyor, a schoolmaster, a glass-blower, a blacksmith, and a baker, all employments having a direct influence in causing determination of blood to the eyes.

Strong presumptive evidence of the existence of congestion is afforded by the uneasiness in the eyes which often accompanies this disease. This symptom has scarcely ever been absent in the cases which have fallen under my own observation; and it has varied in degree from a sensation of discomfort to a positive pain of a dull aching character. A cook, whom I have recently seen, with Conical Cornea in both eyes, complained of pain, tenderness, and sense of distension of the globes. Another symptom indicating conjestion is the frequent occurrence of muscæ volitantes. Of seven patients whom I questioned, six described the appearance of these annoying phantasms as being of daily occurrence. We have, therefore, sufficient ground for connecting the conicity of the cornea, in many cases, with congestion, occurring in combination with deficient nervous energy and feeble power. Persons who appear most subject to Conical Cornea, are those in whom asthenic choroiditis is frequently observed; and the supposition is not unreasonable, that the same influences which produce congestion of the choroid, may be exciting causes of Conical Cornea, by interrupting the circulation in the corneal zone of vessels.

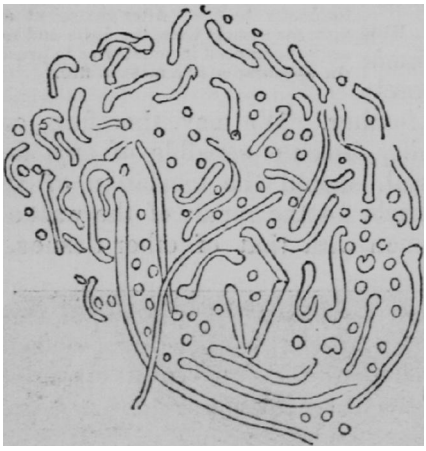

Fig. 8.
Muscæ volitantes seen on looking at a luminous object.

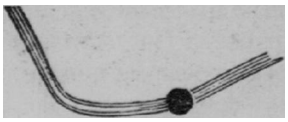

Fig. 9.
Fixed Musca, seen chiefly during reading.

If the vessels of a part are deficient in nervous energy, they will be

in a condition favourable for the occurrence of congestion, their power of vital resistance or tonicity being impaired. Excitement of the sensitive nerves of the cornea calls forth antagonistically, according to Henle's principle, a state of depression—a temporary paralysis of the motor nerves of the contractile fibres of the walls of the small arteries, opening into the capillary network of the conjunctiva and sclerotica adjacent to the cornea; the effect will be, first, relaxation and dilatation of those arteries, and then accumulation and stagnation of blood in the capillaries. If the capillaries which surround the cornea and supply it with nourishment are thus deficient, congestion will speedily arise, and the effect will be to diminish the exudation of nutrient fluid from them, and consequently to interrupt the process of assimilation in the membrane. Then the centre of the cornea, being the most distant point, will exhibit the deficiency in the most marked degree; and the balance of nutrition and absorption being lost, attenuation of that part will occur. If we suppose the congestion to go somewhat further, and lymph to be thrown out, we may expect to find the margin of the cornea thickened, whilst its centre is unusually thin.

Ulceration of the cornea is sometimes followed by that membrane assuming the conical form. It is not surprising, that a spot deprived of the anterior elastic lamina, should be thereby weakened, and less able to resist the pressure from behind. In such cases, the dimple or cicatrix of the ulcer usually forms the apex of the cone.

Conical Cornea is, undoubtedly, a frequent consequence of inflammation of the membrane; particularly when modified by struma. Dr. Mackenzie informs me that he has seen it associated with scrofulo-catarrhal ophthalmia, with opacities, and with pterygium; Dr. Butter of Plymouth has seen it after purulent ophthalmia, and after ulcers of the cornea; such also has been my experience. Dr. J. C. Hall relates a case in which it followed syphilitic iritis; and it has been pointed out by that gentleman, and also by Mr. Wilde, that when Conical Cornea is the sequel to inflammatory action, the abnormal curvature is not limited to the cornea, but commences about the insertion of the recti muscles in the sclerotic. I have seen a well-marked example of this, and the form of the eye has been aptly compared to that of the eyes of raptorial birds. The opinions of Dr. Jaeger of Vienna are, at all times, entitled to the highest respect, and I may here introduce an interesting and important letter with which he favoured me.

"Vienna, June 1, 1847.

"Sir,—Having had occasion to observe cases of staphyloma pellucidum during a space of forty years, I consider it to be the result of a specific inflammation of the cornea veritatis, or a symptom of this inflammation. In the first case, excepting a Conical enlargement and greatly increased expanse of the cornea, with more or less opacity of the projecting part, there is nothing morbid, and the functions of the eye would be well performed, were it not for the faulty form of the cornea. In the second, besides the conical form of the cornea there is inflammation of the eye present, but especially of the cornea, and the opacity and conical shape of the cornea are merely symptoms of the inflammation. The opacity of the cornea may be looked upon as the redness of inflammation elsewhere, and the cone is induced by the loss of elasticity in the tissues, and the softening of the cornea itself.

"The thickness of the cornea varies. In the first series of cases it is thin and membranous at the apex: in the second class, it is double, or even three times its natural thickness, the tissues being soft, loose, and swollen.

"The character of the inflammation which gives rise to staphyloma pellucidum, is generally scrofulous, such as affects fibrous and cartilaginous tissues; but rheumatic and syphilitic inflammations, especially when combined, also tend to induce this deformity. It may be observed, and that not uncommonly, as a result of gonorrhœal ophthalmia. The loss of the outer or conjunctival layer of the cornea will give rise to this affection; but the why and the wherefore are not yet sufficiently explained. Staphyloma pellucidum is rarely congenital; it is generally developed during the first years of life, and sometimes at a more advanced period; but being once developed, it is never lost The prognosis is doubtful. A cure is only to be thought of in the commencement of the disease—the inflammatory stage; this past, treatment is for the most part useless.

"The indications are, to treat rationally the existing inflammation as regards its nature, degree, and character. If the staphyloma be a *residuum morbi*, medicinal application we find avail not; neither can benefit be afforded by operative means. Extraction of the lens and formation of artificial pupil, accomplish nothing towards a cure—or something very imperfect. The same may be said with respect to the partial removal of the cornea. This is all that I am able to say upon this subject. DR. FR. JAEGER."

By Dr. Jacob, of Dublin, who is a high authority, Conical Cornea is considered as a decided result of true corneitis. "I am prepared (says he) for a denial of the correctness of this statement, that the *staphyloma pellucidum* or Conical Cornea, is owing to the disease under discussion (true corneitis); but I nevertheless venture to insist upon it, because I have seen and traced the change from its commencement to its termination, more than once. That there should be doubt and difference of opinion on the subject is not surprising, because true corneitis is not a very common disease, and the change in shape to the conical is not a frequent consequence of it. The alteration takes place in childhood; for the disease generally occurs at that period of life, and, after the inflammation has disappeared, and the opacity has been dissipated, no defect except this conical state remains. . . . . That I have seen the cornea become opaque from corneitis, then conical, and finally perfectly transparent, I am quite positive; but not only have I seen this, but also have I seen it become distinctly conical, in a case of a common idiopathic inflammation of the eyeball in a man of middle age, although not transparent or resembling the true staphyloma pellucidum."[1]

Dr. Mackenzie also has known it to arise from corneitis, and informs me of an interesting case—that of a young lad in whom it followed a blow with a snow-ball.

Several authorities agree that it may be the result of excessive weeping, the most striking illustration of which, is afforded by the following case, related to me by Dr. Farre, the Nestor of English ophthalmic physicians.

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[1] A Treatise on the Inflammation of the Eye-ball, p. 196.

"Many years ago I was called in to see a young lady under the following circumstances. She was one of two sisters who were devotedly attached and scarcely ever apart. Her sister died; and so excessive was the poor girl's grief for her loss, that for several months she never ceased to weep—tears constantly stood in her eyes. The effect of this constant excitement of the organs of vision, was to produce, first, Conical Cornea in a marked degree, and secondly, opacity not only of the apices of the cones, but of the whole of the cornea, rendering them quite leucomatous; and this condition could only be relieved in a very trifling degree." Mr. Square, of Plymouth, informs me that he has seen a great many cases of Conical Cornea, that the subjects of it were principally delicate females, and that the cause has apparently been traceable to grief and the depressing emotions of the mind. Mr. Tyrrell told me, shortly before his death, that he had seen a case very similar to that related by Dr. Farre. That excessive weeping should induce Conical Cornea is not surprising, when we bear in mind that it would have the effect of keeping up a continued state of congestion of the eyes, combined with compression of the globes,—circumstances highly favourable for the development of the disease under consideration.

Conical Cornea is described by many writers as the occasional result of violent muscular contractions and convulsive efforts. A case of a man who was hanged, recorded in the first volume of Haller's *Disputationes Chirurgicæ*, is generally quoted as a striking illustration. It was addressed from Rostock, by C. Burgmann, to Heister, in 1729, and is illustrated by a plate, which fortunately enables us to form our own opinions as to the probability of the case. The globes of the eyes are represented as retaining their proper form, but the corneæ have been squeezed into two processes, which reach to the end of the nose, and in shape, resemble the swim-bladder of certain fishes. The length of each would be about an inch and a half, and the breadth at the base about half an inch; and the question which naturally arises is, with what can these sacs have been filled? The globes retaining their form, it cannot be lens and vitreous humour; and aqueous humour would not be secreted so quickly, or distend the corneæ so violently, without bursting them. My own impression is, that the case has been much exaggerated; for if hanging produced such effects, the case would scarcely be a solitary one.

Pathology.[1] The late Sir William Adams, with more confidence than accuracy, gave it as his decided opinion, that Conical Cornea was the result of a morbid growth and thickening of the substance of the cornea. In this opinion he stands nearly, if not quite alone, and every fact that has been ascertained, is adverse to it. The rarity of the affection renders opportunities of examining such diseased eyes after death very uncommon; consequently, much interest attaches to the autopsies which have taken place. It may be mentioned, that a difference of opinion exists as to the precise form of the healthy cornea. Kraüse, of

[1] I regret that I have not been able to refer to the writings of M. Sichel on Conical Cornea: he informed me by letter that they are contained in the Second Supplement to the *Annales d'oculistique* for 1843. Singular to say, the supplementary numbers are not contained in any of the sets to which I have had access in London, and I have therefore been unable to consult the papers in question.

Hanover, states that the cornea is thicker at the circumference than the centre, rendering the exterior surface nearly spherical, the interior parabolic. Mr. Bowman and others are of opinion, that the thickness of the cornea is equal throughout, and that the two surfaces are perfectly parallel. I have taken some pains to satisfy myself on this point; and, I incline to the latter opinion, though, from the difficulty attending the examination of the cornea in what may be considered its perfectly natural state, the point is not yet satisfactorily established.

More than one instance is recorded, where a Conical Cornea has been burst; and the tenuity of the membrane when the disease is far advanced, but before it has become opaque, may be ascertained by pressing upon it with a probe. The sharpness of the margins of the depressions, and the absence of that toughness which characterises the natural Cornea, sensibly indicate its thinness, which is fully confirmed by the following accounts of necropsies. Mr. Middlemore states,[1] "I have had one opportunity of examining, after death, the state of the cornea, which was affected with Conical Cornea in an extreme degree; and in that instance, its laminæ were less moveable, its circumference was of a natural and ordinary degree of thickness, but its apex was much thinner than usual, and rendered opaque on its exterior only, for its neural surface, even at the apex, was perfectly transparent; in other respects, it did not appear to have undergone any change, unless I mention that alteration in the evenness and equality of its surface, discovered by Dr. Brewster, but which was not visible to the naked eye." The late Mr. Walker, of Manchester, informed me that he had examined a similar eye. "There was", said he, "great attenuation of the cornea throughout its entire substance, especially at its central portion." From Dr. Butter I learn, that in cases which he has examined, the cornea became thicker towards the base, and thinner in the centre. Dr. J. C. Hall writes,—"Some years ago I examined a case after death. I cannot, at this moment, find a note of the case; but I am certain that the circumference of the cornea was of the usual thickness, and that the apex was very much thinner than natural. The changes also appeared confined to the exterior; the neural surface was bright even at the circumference". Professor Jaeger, of Erlangen, has published the result of the dissection of a case, as follows: "When the cornea was taken between the fingers, there was distinctly perceived a depression in the centre, surrounded by a thick, prominent ring. On making a section of the cornea through its centre, the middle third was found three times thinner than natural, like thin writing paper; the two outer thirds were manifestly thickened, a condition which was especially conspicuous in the central lamellæ, but not in the most external or internal. The middle substance was homogeneous; the thickening of the external part was gradually lost in that which had become thin, so that the diameter of the latter was about equal to that of the expanded pupil."

It would appear, therefore, that the principal changes which take place, are in the anterior elastic lamina, and cornea proper; the former losing its toughness and power of resistance, the latter being diminished in thickness and cohesion towards the centre, and, in some cases, thick-

[1] A Treatise on the Diseases of the Eye, vol. i, p. 532.

ened towards the circumference. In future cases, it will be interesting to ascertain whether the anterior elastic lamina and its filaments of connexion, can still be traced, and what is the precise condition of the cornea proper during the various stages of the disease.

The treatment of Conical Cornea will form the subject of another communication.

(To be continued.)

19, Berkeley Square, March 1850.

THE TYPES OF DELIRIUM TREMENS, THEIR PATHOLOGY AND TREATMENT.

By JAMES BIRD, A.M., M.D.

In the following paper, I propose to consider the types of Delirium Tremens, or rather the pure form of this disease in relation to sequent and kindred affections of the brain, caused by the intemperate use of alcoholic drinks, aided by other predisposing causes.[1] The types of the disease are at present variously arranged, in nosological systems, as *Delirium Tremens nervosum et traumaticum, phrenesia potatorum, encephalitis tremefaciens, delirium afebrile tremens, and irritative fever of drunkenness.* I am not aware that there exists any description of Delirium Tremens, embracing its modifications and complications, which can be considered practically applicable as a guide to the treatment of the disease in all its varieties. I shall, therefore, describe the disease in its simple form and in its complications, characterizing each by a distinct definition; so that the relations and differences of the modifications may be at once seen, and made the foundation of a like modified treatment. The facts and illustrations of this paper are taken from numerous cases, received into the European General Hospital at Bombay, from the beginning of 1836 to the end of 1840, and which were treated either by the hospital assistants or myself.

The most usual divisions of this disease have been into two species; the one succeeding the excitement of hard drinking, without any intermediate abstinence from the accustomed stimulus; the other, attacking habitual drunkards soon after the accustomed stimulus had been withdrawn. The former may be considered as a state of *hyperæsthesia*, and increased vascular action in the nervous centres, or in the remote organs

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[1] Many of the erroneous principles acted on, at various times, in practical medicine, have been drawn from narrow-minded views of the specialities of diseases, considered as *entities*, and without reference to the analogies of their phenomena. Nosology, to be of real practical utility in medicine, must have its foundation in the relations which exist between modified states of disease, each leading to important points of practice. The influence which one class of morbid functional derangements has in modifying the conditions of subordinate functions in other classes, should be made an important consideration in our study of diseases affecting different tissues, but associated in their phenomena and progress, as originating in derangements common to all their modifications.